PATENT ABSTRACTS OF JAPAN

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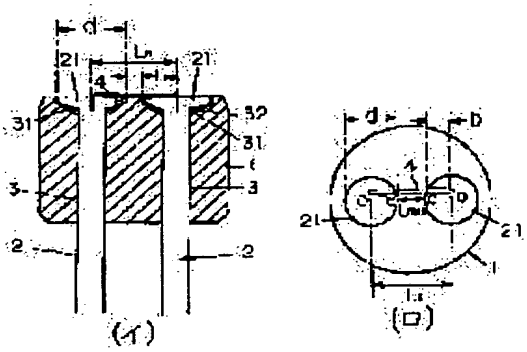
) BLOCK PLUG FOR DETONATOR AND MANUFACTURE THEREOF

)Abstract:
OBLEM TO BE SOLVED: To provide a block plug which can stably set resistance value of a bridge wire between lead pins to a desired value wide range without influence of applied pressure by igniting explosive vder by excluding the directionality of a lead pin insertion hole without ulating the cross angle of the wire between the end faces of the pins.
LUTION: The block plug for a detonator comprises a bridge wire nected between the end faces of a pair of lead pins 2 of an insulation g 1 through which the pair of lead pins 2 are passed, and pircular collars formed at the ends of the pins 2, wherein the ratio L1/Lmin of the rtest interval Imin between the collars to the interval L0 between the ters of both the collars is set to 2.5 or more, and the wire 4 is nected to the surface of the collar 21 by including the collar edge sitions (e).



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AIMS

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aim(s)]
aim 1] In the plug for detonators which comes to join a bridge line between the tip end faces of each lead pin of the ılating plug which installed the lead pin of a pair the tip of each lead pin -- a circular flange -- forming -- the ratio of shortest spacing Lmin between flanges, and the spacing L0 of both the flange center to center -- the plug for ɔnators which makes L0-/Lmin 2.5 or more, and is characterized by performing junction on a bridge line and a flange ıt face including a flange edge location.
aim 2] In the approach of connecting a bridge line between the tip end faces of both the lead pin, and manufacturing plug for detonators by welding the tip end face of each lead pin of an insulating plug and each edge of a bridge line ch installed the lead pin of a pair L0-/Lmin is made or more into 2.5. the tip of each lead pin -- a circular flange -- ning -- the ratio of the shortest spacing Lmin between flanges, and the spacing L0 of both the flange center to center he manufacture approach of the plug for detonators characterized by contacting one welding electrode of a stance welding machine in the bridge end-of-line section, and making the edge of the above-mentioned flange rflow partially, arranging, contacting the welding electrode of another side on a flange front face directly, and ding between each bridge end-of-line section and each flange front face by resistance.

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ΓAILED DESCRIPTION

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tailed Description of the Invention]
)1]
ld of the Invention] This invention relates to the plug for detonators, and its manufacture approach.
)2]
scription of the Prior Art] What inserts the plug which comes to connect a bridge line between each lead pin tip end
: of the insulating plug which installed the lead pin of a pair as the detonator used for blasting operations, the
)nator of the blender of concrete, a detonator of the air bag for automobiles, etc. in the light-gage metal cylinder of owner bottom which contained ignition medicine is well-known. In the plug of the above-mentioned detonator, to it as a predetermined value according to an application so that accidental discharge according the resistance of the lge line which connects between lead pins to the stray current and the current for monitors may be eliminated and / carry out ignition actuation certainly with the actuation current for ignition is demanded.
)3] Then, in these people etc., the point of both the lead pin is made un-circular. maximum distance L' between the ine edges which both the lead pin tip end face counters, and ratio L' with the minimum distance L -- as a size /L er than a ratio same as the above in case the cross section of a lead pin is the circular configuration of the same cross ion It already proposed setting the resistance of the bridge line between lead pins as the resistance of the request veen the bridge line resistance of maximum distance, and the bridge line resistance of the minimum distance by ction of the distance (JP,5-133698,A). Moreover, in these people etc., as a welding process of the lead pin tip end : in the above-mentioned plug, and a bridge line, as shown in drawing 7 Bridge line part part 40' on the tip end face ead pin 2' is contacted in one electrode 51' of a resistance welding machine. Welding between the tip end face of the l pin 2' and bridge line part part 40' by resistance directly in contact with the tip end face of this lead pin 2' also ady proposed electrode 52' of another side (JP,5-172498,A). this -- a welding process -- depending -- if -- a lead -- a -- two -- ' -- the whole -- or -- a bridge -- a line -- four -- ' -- the whole -- not heating -- even if -- ending -- since -- a l -- a pin -- two -- ' -- a plug -- one -- ' -- Shilu -- a field -- thermal -- degradation -- or -- a bridge -- a line -- four -- ' - mage -- awe -- there is nothing -- being advantageous .
)4]
)blem(s) to be Solved by the Invention] In the plug for detonators indicated by above-mentioned JP,5-133698,A, ough the resistance of the bridge line between lead pins is set as a predetermined value, it is premised on adjusting cross angle of the bridge line of a between [lead pin tip end faces], and positioning of a bridge line is not easy. reover, since the cross section of the lead pin insertion hole of a plug and a lead pin has directivity to insertion, it is essary to make the direction of both in agreement on the occasion of the insertion, and a lead pin insertion activity omes so troublesome compared with the case where it is the lead pin use whose overall length is a circular cross ion.
)5] Furthermore, in a plug same as the above, since a bridge line is pressurized with ignition medicine (4' is a bridge and setting to drawing 8 71' is ignition medicine) a bridge -- a line -- a lead -- a pin -- a tip -- an end face -- welding rawing 8 -- (b) -- being shown -- as -- a lead -- a pin -- a tip -- an end face -- the edge -- e -- ' -- from -- having been apart -- a location -- e -- " -- from -- a bridge -- the end of line -- E -- ' -- crossing -- carrying out -- having -- **** -- the non-weld e -- the design resistance of 'the bridge line 4 which falls for the above-mentioned pressurization of contact resistance of -e", and makes original die-length L' design die length' Although it is effective to perform ding with a bridge line and a lead pin tip end face including lead pin tip end-face edge location e', and to carry out ign die length of the die-length L as shown in (b) of drawing 8 in order for there to be awe changed for the current ch flows by path i' and to eliminate this fault In this case, in order to use the above-mentioned welding process, the er diameter of welding electrode 51' is made quite larger than weld length b' of a bridge line. It is advantageous to

ce it make a part of welding electrode 51' protrude from a lead pin tip end face (recognizing the boundary of the top e of plug 1', and the tip end face of lead pin 2'). Since both approximate in color, it is difficult, therefore it is not easy nake in agreement the edge of a welding electrode end face and the edge of a lead pin apical surface. It is difficult to tact the tip end face of the lead pin of the plug which shows the pair of the welding electrode of this big outer neter in drawing (the plug of a JP,5-133698,A public indication). Application of the above-mentioned welding cess on condition of the cross section being equal to the cross section of the conventional circular lead pin also as un-ular in a lead pin is difficult.

06] The purpose of this invention the plug which comes to weld a bridge line between the tip end faces of each lead of the plug which installed the lead pin of a pair In inserting in the closed-end metal cylinder which contained ition medicine, and manufacturing a detonator The directivity of a lead pin insertion hole is eliminated without usting the cross angle of the bridge line of a between [lead pin tip end faces]. The resistance of the bridge line ween lead pins by the above-mentioned resistance welding method to the request value in wide range It is in offering plug which can be set as stability, and its manufacture approach, without being influenced of welding pressure with ition medicine.

07]

eans for Solving the Problem] In the plug for detonators to which the plug for detonators concerning this invention nes to join a bridge line between the tip end faces of each lead pin of the insulating plug which installed the lead pin pair the tip of each lead pin -- a circular flange -- forming -- the ratio of the shortest spacing Lmin between flanges, the spacing L0 of both the flange center to center -- it is the configuration which makes L0-/Lmin 2.5 or more, and haracterized by performing junction on a bridge line and a flange front face including a flange edge location. In the roach of the manufacture approach of the plug for detonators concerning this invention connecting a bridge line ween the tip end faces of both the lead pin by welding the tip end face of each lead pin of an insulating plug and each e of a bridge line which installed the lead pin of a pair, and manufacturing the plug for detonators L0-/Lmin is made nore into 2.5. the tip of each lead pin -- a circular flange -- forming -- the ratio of the shortest spacing Lmin between nges, and the spacing L0 of both the flange center to center -- It is the configuration characterized by contacting one ding electrode of a resistance welding machine in the bridge end-of-line section, and making the edge of the above-ntioned flange overflow partially, arranging, contacting the welding electrode of another side on a flange front face ectly, and welding between each bridge end-of-line section and each flange front face by resistance.

08]

nbodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to a drawing. nilarly (b) of the sectional view showing the plug for detonators which (b) of drawing 1 requires for this invention, l drawing 1 is a top view. In (b) of drawing 1 , and (b) of drawing 1 , 1 is an insulating plug, for example, the plug de from the ceramics. 2 and 2 are the lead pins of a pair, the circular flange 21 is formed in upper limit, and thickness a flange 21 is made so thick that it results in a flange core side. 3 is the lead pin through tube prepared in the ulating plug, and it considers as the taper hole 31, and **** of a plug end side inserts the lead pin 2 in each through e 3, and has carried out the seal of between the taper hole 31 and flange 21 rear faces with the solid-state apsulants 32, such as glass and an epoxy resin. the outer diameter d of ****** 21 -- the spacing (spacing of a lead center to center) L0 of both the flange center to center -- receiving -- L -- as 0> d>=0.6L0 -- the ratio of the shortest cing Lmin between flanges, and said spacing L0 -- L0-/Lmin is made or more into 2.5. the bridge line which welded etween the flange 21 of the lead pins 2 and 2, and 21 -- it is -- the near core of the edge location e of a flange to the ge 21 -- crossing -- welding -- **** of the endmost part of the bridge line 4 -- suppose un-welding slight die length. s appropriate for this weld length b to carry out by 5 to 10 times the bridge line outer diameter for the guarantee of lding reinforcement. In the above, the flange 21 at the tip of a lead pin can also be made into equal thickness that it ms that it is shown in drawing 2 .

09] Alloys, such as simple substance metals, such as iron, nickel, molybdenum, platinum, a tungsten, and a tantalum, ickel-chromium system, and an iron-chromium-aluminum system, can be used for the above-mentioned bridge line 4. e quality of the material with the easy and connection with a bridge line and the easy above-mentioned seal by glass h a plug 1, an epoxy resin, etc. is used for the above-mentioned lead pin 2, for example, alloys, such as simple stance metals, such as iron, nickel, and copper, and a nickel-iron system, can be used for it.

10] Drawing 3 is the explanatory view showing the manufacture approach of the plug for detonators concerning this ention, and the configuration of a plug is the same as that of what was shown in (b) of drawing 1 , and (b) of drawing After performing the seal by the solid-state encapsulants 32, such as glass between the taper hole 31 and flange 21 r face One welding electrode 51 of a resistance welding machine is contacted in the bridge end-of-line section 40, l it arranges in the condition of having made the edge e of the above-mentioned flange 21 overflowing partially, and

welding electrode 52 of another side is directly contacted on flange 21 front face, and between each bridge end-of-: section 40 and each flange 21 front face is welded by resistance.

11] The welding electrode 51 which drawing 4 shows the outline of the current distribution condition of the welding rent in this case, and touches the bridge end-of-line section 40 is a plus electrode. Since total of the current which vs into the bridge line 4 serves as the bridge line welding current in the flange edge location e from the flash part 510 n the flange edge e of this electrode 51 In order to guarantee the welding reinforcement of the bridge line 4 in the ige edge location e, it is required to enlarge fairly the die length of the flash section 510 from the flange edge e of the s welding electrode 51, and to enlarge the welding current enough (at least 5 or more times of a bridge line outer meter are suitable for flash die length). On the other hand, as described above, it is appropriate for weld length b of bridge line 4 to consider as at least 5 or more times of a bridge line outer diameter for the guarantee of welding iforcement. Therefore, it is appropriate for the outer diameter of the welding electrode 51 to consider as at least 10 or re times of bridge line 4 outer diameter. However, the outer diameter d of a flange 21 is set to L0>d>=0.6L0 to the cing (spacing of a lead pin center to center) L0 of both the flange center to center. Since it is fully size, size in this y the welding electrode of the pair of the becoming outer diameter The minus side welding electrode 52 is contacted ufficient area for a flange top face, and can be welded good (for example, when the outer diameter of a lead pin is mm, L0 is usually set to 3.0mm, therefore the minimum diameter of a collar is set to 1.8mm.). The diameter of a lge line is usually 0.03mm, therefore the minimum value of the outer diameter of a welding electrode is set to mm. the pair of the welding electrode of this diameter -- a collar with an outer diameter of 1.8mm -- even if it itacts a top face by arrangement like drawing 4 , the touch area of the minus welding electrode 52 and flange 21 top e is fully securable.

12] the plug for detonators concerning this invention -- setting -- the ratio of the shortest spacing Lmin between iges, and the spacing L0 of both the flange center to center, as L0/Lmin is made or more into 2.5 and it is shown in of drawing 1 Even if it carries out the bridge line 4 in parallel to Chuo Line O-O passing through the core of both the d pin The ratio of the minimum effective bridge line die length (minimum distance between the flange edges of both lead pin) and the maximum effective bridge line die length is made to 2.5 or more, therefore desired resistance can set up within the limits of this criteria resistance and its resistance of 2.5 times or more by making the resistance of minimum effective bridge line die length into a reference value.

13] Drawing 5 shows the detonator using the plug concerning this invention, and fixes the metal end plate 61 to the ge of a plug 1 by the sealing compounds 62, such as glass and an epoxy resin. While making airtight between one d pin 2a and the metal end plates 61 by welding 63, it flows electrically. It insulates about a gap 64 between other d pin 2bs and the metal end plate 61. this plug with a metal end plate is inserted into the closed-end light-gage metal inder 72 which contained the ignition medicine 71 at the pars basilaris ossis occipitalis, and close to the ignition dicine 71 in the bridge line 4 -- making -- the perimeter of the metal end plate 61 -- a scaw -- while making airtight ibe 610 and opening of the closed-end light-gage metal cylinder 72 by welding 73, it has flowed electrically.

14] Drawing 6 shows example of another of the detonator using the plug concerning this invention, and contacts the ge of a plug 1 in the metal end plate 61. While making airtight between one lead pin 2a and the metal end plates 61 by lding 63, it flows electrically. between lead pin 2b of another side, the metal end plate 61, and plugs 1 -- an insulating lant (glass --) While carrying out the seal of the epoxy resin etc. by 62, between lead pin 2b of another side and the tal end plates 61 is insulated. this plug A is inserted into the closed-end light-gage metal cylinder 72 which contained ignition medicine 71 at the pars basilaris ossis occipitalis, and close to the ignition medicine 71 in the bridge line 4 -- king -- the perimeter of the metal end plate 61 -- a scaw -- while making airtight Urabe 610 and opening of the sed-end light-gage metal cylinder 72 by welding 73, it has flowed electrically. Although it has lead pin insertion ening with a boss of a bore almost equal to a lead pin outer diameter, and lead pin insertion opening of the bore which isists of a lead pin outer diameter size as shown in drawing, what prepared outside the two lead pin insertion enings with a boss with the same bore which consists of a lead pin outer diameter size can also be used for this metal l plate 5. In this case, what is necessary is to extract boss tip of one of the two almost equally to a lead pin outer meter, and just to weld it at the time before welding of welding.

15] Also in which [these] detonator, the danger of the accidental discharge which generating of the potential ference by the electrostatic induction between a light-gage metal cylinder and a lead pin is prevented, and originates lischarge of the potential difference may be eliminated certainly. the above -- also in which detonator, although the dge line is pressurized with ignition medicine, since welding with a bridge line and a lead pin flange front face is formed including the flange edge location, it is maintained uniformly, without the electrical conductance between a dge line and a lead pin flange front face being influenced by the above-mentioned welding pressure, and the setting istance of a bridge line can be held certainly.

16]
ect of the Invention] In the plug for detonators concerning this invention, since junction of a bridge line is easy since idge line is joined without adjusting a cross include angle and the resistance of a bridge line can be broadly set up veen the tip end faces of a lead pin, and the lead pin is circular covering an overall length, insertion of the lead pin to ug can be performed easily without constraint of directivity. Moreover, except the upper limit of a lead pin, since it do thinly, the meat thickness can enough be thickened, without enlarging a plug outer diameter, and the formation small dimension of a plug and mechanical high intensity can be guaranteed well.
17] According to the manufacture approach of the plug for detonators concerning this invention, by furthermore, the roach given [above-mentioned] in JP,5-172498,A Junction on a bridge line and a lead pin flange front face can be ly performed including a flange edge location. Irrespective of the pressurization of a bridge line with ignition licine, the plug for detonators which can hold the setting resistance of a bridge line to stability can be easily ıufactured without thermal degradation of the Shilu side of a lead pin and a plug, or awe of damage on a bridge line.

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AWINGS

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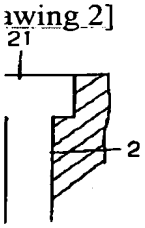
awing 2]



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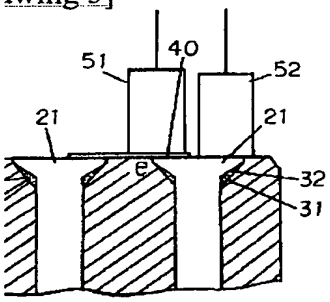

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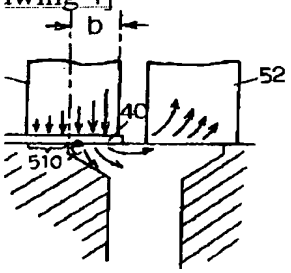

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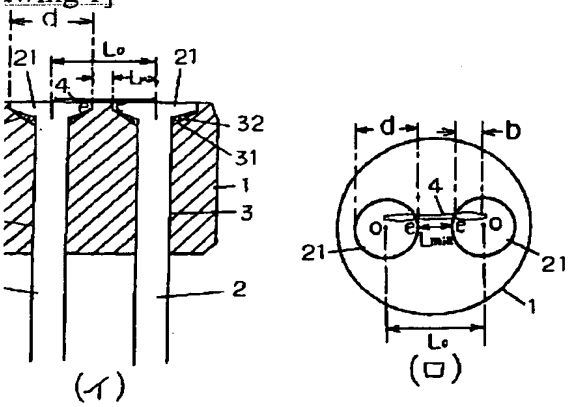

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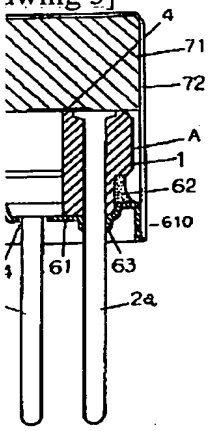

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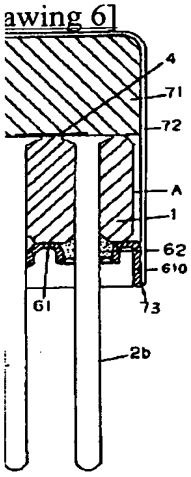

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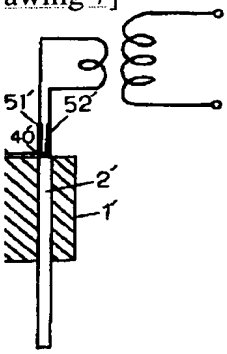

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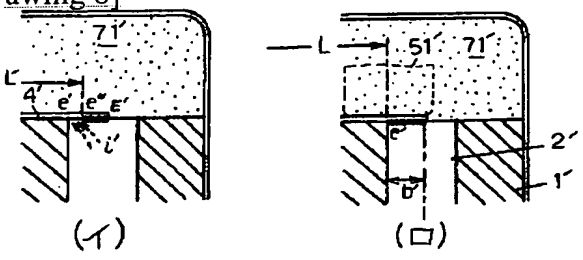

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3/198			3/198	

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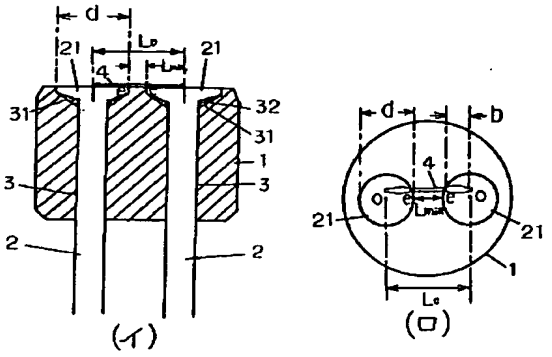
(54)【発明の名称】　雷管用塞栓及びその製作方法

(57)【要約】
【課題】リードピン先端端面間への電橋線のクロス角を調整することなく、リードピン挿通孔の方向性を排除してリードピン間の電橋線の抵抗値を広範囲内の所望値に、着火薬による加圧力の影響を受けることなく安定に設定できる塞栓を提供する。
【解決手段】一対のリードピン２，２を貫設した絶縁栓体１のリードピン２，２の先端端面間に電橋線を接合してなる雷管用塞栓において、各リードピン２の先端に円形鍔部２１を形成し、鍔部間の最短間隔Ｌminと両鍔部中心間の間隔Ｌ。との比Ｌ。／Ｌminを２．５以上とし、電橋線４と鍔部２１表面との接合を鍔部縁端位置ｅを含めて行った。



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【特許請求の範囲】

【請求項１】一対のリードピンを貫設した絶縁栓体の各リードピンの先端端面間に電橋線を接合してなる雷管用塞栓において、各リードピンの先端に円形鍔部を形成し、鍔部間の最短間隔Ｌminと両鍔部中心間の間隔Ｌ。との比Ｌ。／Ｌminを２．５以上とし、電橋線と鍔部表面との接合を鍔部縁端位置を含めて行ったことを特徴とする雷管用塞栓。

【請求項２】一対のリードピンを貫設した絶縁栓体の各リードピンの先端端面と電橋線の各端部とを溶接することにより両リードピンの先端端面間に電橋線を接続して雷管用塞栓を製作する方法において、各リードピンの先端に円形鍔部を形成し、鍔部間の最短間隔Ｌminと両鍔部中心間の間隔Ｌ。との比Ｌ。／Ｌminを２．５以上とし、抵抗溶接機の一方の溶接用電極を電橋線端部に接触させ、かつ上記鍔部の縁端から部分的にはみ出させて配置し、他方の溶接用電極を鍔部表面に直接接触させて各電橋線端部と各鍔部表面との間を抵抗溶接することを特徴とする雷管用塞栓の製作方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は雷管用塞栓及びその製作方法に関するものである。

【０００２】

【従来の技術】爆破作業に用いる雷管、コンクリートの破砕器の雷管、自動車用エアバックの雷管等として、一対のリードピンを貫設した絶縁栓体の各リードピン先端端面間に電橋線を接続してなる塞栓を、着火薬を収納した有底の薄肉金属筒内に挿着するものが公知である。上記雷管の塞栓においては、リードピン間に接続する電橋線の抵抗値を、迷走電流、モニター用電流による暴発を排除し、点火用の作動電流で確実に点火作動させるように、用途に応じて所定値に設定することが要求される。

【０００３】そこで、本出願人等においては、両リードピンの先端部を非円形とし、両リードピン先端端面の対向する外郭縁端間の最大距離Ｌ’と最小距離Ｌとの比Ｌ’／Ｌを、リードピンの断面が同一断面積の円形形状であるときの同上比よりも大として、その距離の選択によりリードピン間の電橋線の抵抗値を最大距離の電橋線抵抗値と最小距離の電橋線抵抗値との間の所望の抵抗値に設定することを既に提案した（特開平５－１３３６９８号公報）。また、本出願人等においては、上記塞栓でのリードピン先端端面と電橋線との溶接方法として、図７に示すように、抵抗溶接機の一方の電極５１’をリードピン２’の先端端面上の電橋線部分４０’に当接し、他方の電極５２’を同リードピン２’の先端端面に直接当接してそのリードピン２’の先端端面と電橋線部分４０’との間を抵抗溶接することも既に提案した（特開平５－１７２４９８号公報）。この溶接方法によれば、リードピン２’の全体または電橋線４’の全体を加熱しなくてもすむので、リードピン２’と栓体１’とのシール界面の熱的劣化または電橋線４’の損傷の畏れがなく、有利である。

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【０００４】

【発明が解決しようとする課題】上記特開平５－１３３６９８号公報に開示された雷管用塞栓においては、リードピン間の電橋線の抵抗値を所定値に設定するのに、リードピン先端端面間への電橋線のクロス角を調整することを前提としており、電橋線の位置決めが容易ではない。また、塞栓のリードピン挿通孔、リードピンの断面が挿通に対して方向性を有するから、その挿通に際して両者の方向を一致させる必要があり、全長が円形断面であるリードピン使用の場合に較べてリードピン挿通作業がそれだけ厄介となる。

【０００５】更に、同上塞栓においては、電橋線が着火薬（図８において４’は電橋線、７１’は着火薬）で加圧されるために、電橋線とリードピン先端端面との溶接が図８の（イ）に示すようにリードピン先端端面の縁端ｅ’から隔たった位置ｅ”から電橋線端E'にわたって行われていると、非溶接部分ｅ’－ｅ”の接触抵抗が上記加圧のために低下し、本来の長さL'を設計長さとする電橋線４’の設計抵抗値が、経路ｉ’で流れる電流のために変動する畏れがあり、かかる不具合を排除するには、図８の（ロ）に示すように、電橋線とリードピン先端端面との溶接をリードピン先端端面縁端位置ｅ’を含めて行い長さＬを設計長さすることが有効であるが、この場合、上記した溶接方法を用いるには、溶接電極５１’の外径を電橋線の溶接長さｂ’よりもかなり大きくし、溶接電極５１’の一部をリードピン先端端面からはみ出させるようにすることが有利であり(栓体１’の上面とリードピン２’の先端端面との境界を認識することは、両者が色彩的に近似しているために困難であり、従って、溶接電極端面の縁とリードピン先端面の縁とを一致させることは容易ではない)、かかる大きな外径の溶接電極の一対を図に示す塞栓のリードピンの先端端面に当接することは困難であって（特開平５－１３３６９８号公開示の塞栓は、リードピンを非円形としても、その断面積は従来の円形リードピンの断面積に等しいことを前提としている）、上記した溶接方法の適用は困難である。

【０００６】本発明の目的は、一対のリードピンを貫設した栓体の各リードピンの先端端面間に電橋線を溶接してなる塞栓を、着火薬を収納した有底金属筒内に挿着して雷管を製作するにあたり、リードピン先端端面間への電橋線のクロス角を調整することなく、リードピン挿通孔の方向性を排除してリードピン間の電橋線の抵抗値を広範囲内の所望値に上記の抵抗溶接法により、着火薬による加圧力の影響を受けることなく安定に設定できる塞栓とその製作方法を提供することにある。

【０００７】

【課題を解決するための手段】本発明に係る雷管用塞栓

は、一対のリードピンを貫設した絶縁栓体の各リードピンの先端端面間に電橋線を接合してなる雷管用塞栓において、各リードピンの先端に円形鍔部を形成し、鍔部間の最短間隔Ｌminと両鍔部中心間の間隔Ｌ。との比Ｌ。／Ｌminを２．５以上とし、電橋線と鍔部表面との接合を鍔部縁端位置を含めて行ったことを特徴とする構成である。本発明に係る雷管用塞栓の製造方法は、一対のリードピンを貫設した絶縁栓体の各リードピンの先端端面と電橋線の各端部とを溶接することにより両リードピンの先端端面間に電橋線を接続して雷管用塞栓を製作する方法において、各リードピンの先端に円形鍔部を形成し、鍔部間の最短間隔Ｌminと両鍔部中心間の間隔Ｌ。との比Ｌ。／Ｌminを２．５以上とし、抵抗溶接機の一方の溶接用電極を電橋線端部に接触させ、かつ上記鍔部の縁端から部分的にはみ出させて配置し、他方の溶接用電極を鍔部表面に直接接触させて各電橋線端部と各鍔部表面との間を抵抗溶接することを特徴とする構成である。

【０００８】

【発明の実施の形態】以下、図面を参照しつつ本発明の実施の形態について説明する。図１の（イ）は本発明に係る雷管用塞栓を示す断面図、図１の（ロ）は同じく平面図である。図１の（イ）及び図１の（ロ）において、１は絶縁栓体例えば、セラミックス製栓体である。２，２は一対のリードピンであり、上端に円形鍔部２１を形成してあり、鍔部２１の肉厚は鍔部中心側に至るほど厚くしてある。３は絶縁栓体に設けたリードピン貫通孔であり、栓体一端面の孔口はテーパ孔３１とし、各貫通孔３にリードピン２を挿通し、テーパ孔３１と鍔部２１裏面との間をガラスやエポキシ樹脂等の固体封止剤３２でシールしてある。上記鍔２１の外径ｄは、両鍔部中心間の間隔（リードピン中心間の間隔）Ｌ。に対しＬ。＞ｄ≧０．６Ｌ。として、鍔部間の最短間隔Ｌminと前記間隔Ｌ。との比Ｌ。／Ｌminを２．５以上としている。４はリードピン２，２の鍔部２１，２１間に溶接した電橋線であり、鍔部の縁端位置ｅから鍔部２１の中心近傍にわたり溶接し、電橋線４の最端部の極く僅かの長さは非溶接としてある。この溶接長さｂは、溶接強度の保証のために、電橋線外径の５～１０倍とすることが適切である。上記において、リードピン先端の鍔部２１は、図２に示すように等厚とすることもできる。

【０００９】上記電橋線４には、鉄、ニッケル、モリブデン、白金、タングステン、タンタル等の単体金属、ニッケルークロム系、鉄－クロム－アルミニウム系等の合金を使用できる。上記のリードピン２には、電橋線との接続が容易で、かつ栓体１とのガラス、エポキシ樹脂等による上記のシールが容易な材質を使用し、例えば、鉄、ニッケル、銅等の単体金属、ニッケル－鉄系等の合金を使用できる。

【００１０】図３は本発明に係る雷管用塞栓の製作方法を示す説明図であり、塞栓の構成は図１の（イ）及び図

１の（ロ）に示したものと同一であり、テーパ孔３１と鍔部２１裏面との間のガラス等の固体封止剤３２によるシールを行ったのちに、抵抗溶接機の一方の溶接用電極５１を電橋線端部４０に接触させ、かつ上記鍔部２１の縁端ｅから部分的にはみ出させた状態で配置し、他方の溶接用電極５２を鍔部２１表面に直接接触させて各電橋線端部４０と各鍔部２１表面との間を抵抗溶接していく。

【００１１】図４はこの場合の溶接電流の電流分布状態の概略を示し、電橋線端部４０に接触している溶接電極５１がプラス電極であり、この電極５１の鍔部縁端ｅからのはみ出し部分５１０から電橋線４に流入する電流の総和が鍔部縁端位置ｅでの電橋線溶接電流となるから、鍔部縁端位置ｅでの電橋線４の溶接強度を保証するには、プラス溶接電極５１の鍔部縁端ｅからのはみ出し部５１０の長さを相当に大きくしてその溶接電流を充分に大きくすることが必要である（はみ出し長さは電橋線外径の少なくとも５倍以上が適切である）。一方、電橋線４の溶接長さｂは、上記したように、溶接強度の保証のために、電橋線外径の少なくとも５倍以上とすることが適切である。従って、溶接電極５１の外径は、電橋線４外径の少なくとも１０倍以上とすることが適切である。しかるに、鍔部２１の外径ｄは両鍔部中心間の間隔（リードピン中心間の間隔）Ｌ。に対しＬ。＞ｄ≧０．６Ｌ。としてあり、充分に大であるから、このように大なる外径の一対の溶接電極でも、マイナス側溶接電極５２を鍔部上面に充分な面積で接触させて良好に溶接できる（例えば、リードピンの外径が１．０ｍｍの場合、Ｌ。は通常、３．０ｍｍとされ、従って、鍔の最小直径は１．８ｍｍとなる。電橋線の直径は、通常、０．０３ｍｍであり、従って、溶接電極の外径の最小値は１．０ｍｍとなる。かかる直径の溶接電極の一対を、外径１．８ｍｍの鍔上面に図４のような配置で当接しても、マイナス溶接電極５２と鍔部２１上面との接触面積を充分に確保できる）。

【００１２】本発明に係る雷管用塞栓においては、鍔部間の最短間隔Ｌminと両鍔部中心間の間隔Ｌ。との比Ｌ。／Ｌminを２．５以上としてあり、図１の（ロ）に示すように、両リードピンの中心を通る中央線Ｏ－Ｏに対し電橋線４を並行にしても、最小有効電橋線長さ（両リードピンの鍔部縁端間の最小距離）と最大有効電橋線長さの比を２．５以上にでき、従って、最小有効電橋線長さの抵抗値を基準値として、この基準抵抗値とその２．５倍以上の抵抗値との範囲内で所望の抵抗値を設定できる。

【００１３】図５は本発明に係る塞栓を用いた雷管を示し、栓体１の端部に金属端板６１をガラスやエポキシ樹脂等のシール剤６２で固定し、一方のリードピン２ａと金属端板６１との間を溶接６３により気密化すると共に電気的に導通し、他のリードピン２ｂと金属端板６１と

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の間はギャップ６４で絶縁し、この金属端板付塞栓を、底部に着火薬７１を収納した有底薄肉金属筒７２内に挿入して電橋線４を着火薬７１に密接させ、金属端板６１の周囲スカート部６１０と有底薄肉金属筒７２の口とを溶接７３により気密化すると共に電気的に導通してある。

【００１４】図６は本発明に係る塞栓を用いた雷管の別例を示し、栓体１の端部に金属端板６１を当接し、一方のリードピン２ａと金属端板６１との間を溶接６３により気密化すると共に電気的に導通し、他方のリードピン２ｂと金属端板６１と栓体１との間を絶縁シール材（ガラス、エポキシ樹脂等）６２でシールすると共に他方のリードピン２ｂと金属端板６１との間を絶縁し、この塞栓Ａを、底部に着火薬７１を収納した有底薄肉金属筒７２内に挿入して電橋線４を着火薬７１に密接させ、金属端板６１の周囲スカート部６１０と有底薄肉金属筒７２の口とを溶接７３により気密化すると共に電気的に導通してある。この金属端板５には、図に示すように、リードピン外径とほぼ等しい内径のボス付きリードピン挿通口と、リードピン外径よりも大なる内径のリードピン挿通口とを有するものの外に、リードピン外径よりも大なる内径の同じボス付きリードピン挿通口を２つ設けたものを使用することもできる。この場合、溶接前あるいは溶接時に片方のボス先端をリードピン外径にほぼ等しく絞り、溶接すればよい。

【００１５】これら何れの雷管においても、薄肉金属筒とリードピンとの間での静電誘導による電位差の発生が防止されその電位差の放電に起因する暴発の危険性が確実に排除され得る。上記何れの雷管においても、電橋線が着火薬で加圧されているが、電橋線とリードピン鍔部表面との溶接を鍔部縁端位置を含めて行っているから、電橋線とリードピン鍔部表面との間の電気コンダクタンスが上記加圧力に影響されること無く一定に維持され、電橋線の設定抵抗値を確実に保持できる。

【００１６】

【発明の効果】本発明に係る雷管用塞栓においては、リードピンの先端端面間に電橋線をクロス角度を調整すること無く接合して電橋線の抵抗値を広範囲に設定できる＊

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＊から、電橋線の接合が容易であり、また、リードピンが全長にわたり円形であるから、栓体へのリードピンの挿通を方向性の制約無く容易に行い得る。また、リードピンの上端以外は細くできるので、栓体外径を大きくすること無くその肉厚みを充分に厚くでき、栓体の小寸法化、機械的高強度をよく保証できる。

【００１７】更に、本発明に係る雷管用塞栓の製作方法によれば、上記した特開平５－１７２４９８号記載の方法により、電橋線とリードピン鍔部表面との接合を鍔部縁端位置を含めて容易に行うことができ、着火薬による電橋線の加圧にかかわらず、電橋線の設定抵抗値を安定に保持できる雷管用塞栓を、リードピンと栓体とのシール界面の熱的劣化または電橋線の損傷の畏れなしに容易に製作できる。

【図面の簡単な説明】

【図１】図１の（イ）は本発明に係る雷管用塞栓を示す断面図、図１の（ロ）は同じく平面図である。

【図２】本発明に係る雷管用塞栓のリードピンの円形鍔部の別例を示す説明図である。

【図３】本発明に係る雷管用塞栓の製作方法を示す説明図である。

【図４】本発明に係る雷管用塞栓の製作方法での溶接電流の分布状態を示す説明図である。

【図５】本発明に係る塞栓を用いた雷管の一例を示す説明図である。

【図６】本発明に係る塞栓を用いた雷管の別例を示す説明図である。

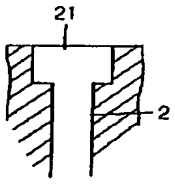
【図７】従来の雷管用塞栓の製作方法を示す説明図である。

【図８】従来の雷管用塞栓の電橋線の抵抗値の不安定性を示す説明図である。

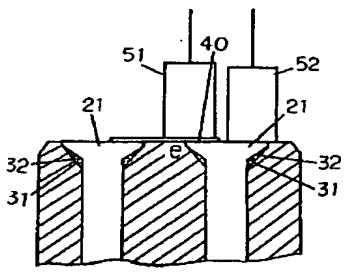
【符号の説明】

1	栓体
2	リードピン
21	円形鍔部
e	鍔部縁端位置
4	電橋線

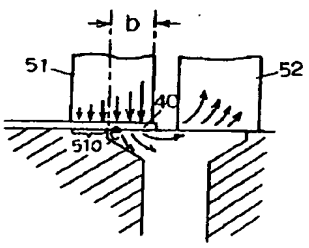
【図２】



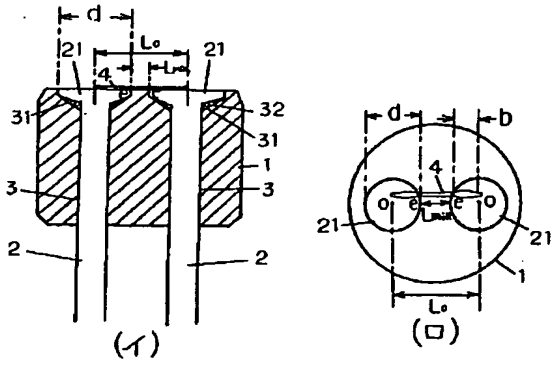
【図３】



【図４】



【図1】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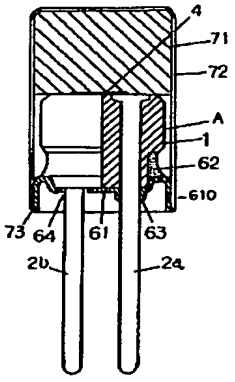
【図5】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72
A
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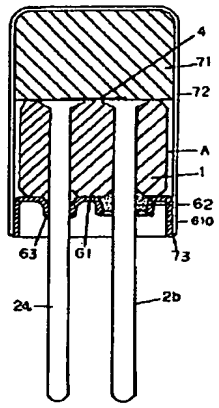
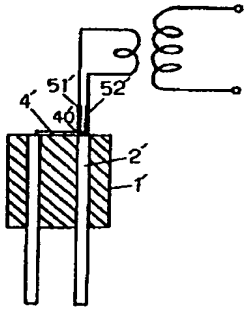
610
73
64
61
63
2b
2a

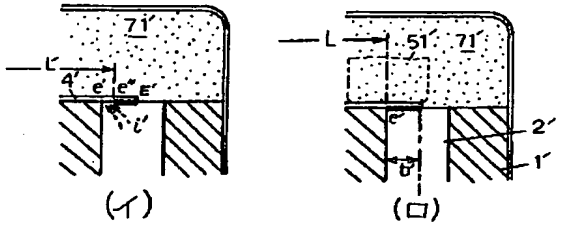
【図6】


4
71
72
A
1
62
610
63
61
73
2a
2b

【図7】


4'
51'
52'
40
2'
1'

【図8】


71'
L'
4'
e'
e''
E'
i'
(イ)
L
51'
71'
e'
2'
b'
1'
(ロ)

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